C Volume Management Configuration Files

During system startup, the Volume Manager starts each Library Manager that is specified in the VM configuration file. A Library Manager is added to the VM configuration file when you configure a Library Manager by using the **lmconfig** utility.

This chapter provides detailed information about the Volume Manager and Library Manager configuration files.

The chapter contains the following sections:

- Volume Manager Configuration File
- Library Manager Configuration Files

See Chapter 17 "Configuring Library Managers" for information about using the lmconfig utility.

Volume Manager Configuration File

When you install the software, a default configuration file (vm.cfg) is added to the /usr/epoch/etc/vm directory.

EMC sets the recommended values for parameters in the vm.cfg file and, in most cases, these do not require modification. The only time vm.cfg needs to be modified is when you add a Library Manager; lmconfig manages this when you run the script to configure a Library Manager.

Figure C-1 provides a sample vm.cfg file. (Note that comment lines begin with the # character.)

Table C-1 describes the parameters and default values in the vm.cfg file.

Figure C-1 **Volume Manager Configuration File**

```
# The following is a default configuration file for a vmda
#
# Limitations:
# o LM_HOST must always be localhost
# o VM_ALLOW_DUP* must always be no
# o VM_METRIC* are not used yet
# o VM_LOCAL_ONLY_ACCESS must always say no
# o VM_AUTH_TYPE may only by RPC_UNIX
#

VM_NAME : vm
VM_ROOT : /usr/epoch/etc/vm

VM_SYSLOGLEVEL : concise

VM_WATCHDOG_LMS : yes
VM_CATALOG_DIR : /usr/epoch/etc/vm
```

```
#

VM_ALLOW_DUP_BARCODE_IMPORT : no
VM_ALLOW_DUP_SEQ_IMPORT : no
VM_METRIC_INTERVAL : 60
VM_METRIC_EXPIRATION : 33
VM_LOCAL_ONLY_ACCESS : no
VM_AUTH_TYPE : RPC_UNIX

# Field for the offline mount user routine for new media request
VM_NEW_MEDIA_USR_ROUTINE : /bin/true

VM_VOLFILE_DIR : /usr/epoch/etc/vm

# The CLOG_SIZE value determines how large the vm's debugging
# circular clog size is allowed to be. The circular log or clog
# file is only written to when the vmdaemon is in debugging
# mode. A CLOG_SIZE OF 0 MEANS INFINITE, I.E. NOT CIRCULAR
VM_CLOG_SIZE : 10485760

# The VM_ERASE_LIMIT controls if and how the vmdaemon limits
# the number of concurrent volume erases per library unit.
# NONE : no limit on the number of concurrent volume
# erases in an LU
# NUM_DRIVES : concurrent erase daemons are limited to the number
# of drives in the LU containing the volumes.
# HALF_OF_DRIVES : concurrent erase daemons are limited to half of
# the number of drives in the LU containing the volumes.
# If the number is odd, it will be rounded up.
VM_ERASE_LIMIT : NUM_DRIVES

#The VM_FIND_AVAIL_MEDIA_INTERVAL determines after how many
# VM activities search for available media will be done.
VM_FIND_AVAIL_MEDIA_INTERVAL : 25

VM_DUP_NUM_ACTIVE : 1
VM_DUP_STATE : enabled
VM_DUP_TAPE_PAD : 10
```

```
#BEGIN_offline_0
LM_START : 0
LM_NAME: offline_0
LM_HOST : edmdoc
LM_EXEC_OPT : ""
LM_EJECT_DEST : offsite_0
LM_END : 0
#END_offline_0
#BEGIN_offsite_0
LM_START : 0
LM_NAME: offsite_0
LM_HOST : edmdoc
LM_EXEC_OPT : ""
LM_EJECT_DEST : offline_0
LM_END : 0
#END_offsite_0
#BEGIN_qntm_x700_0
LM_START : 0
LM_NAME: qntm_x700_0
LM_HOST : edmdoc
LM_EXEC_OPT : ""
LM_EJECT_DEST : offline_0
LM_END : 0
#END_qntm_x700_0
#BEGIN_hp_c17xx_0
LM_START : 0
LM_NAME: hp_c17xx_0
LM_HOST : edmdoc
LM_EXEC_OPT : ""
LM_EJECT_DEST : offline_0
LM_END : 0
#END_hp_c17xx_0
```

Table C-1 Volume Management Configuration Parameters

Parameter	Description
VM_NAME	Identifies the name of the Volume Manager. The default is vm. This name is used in system log messages to identify the process that generated the message.
VM_ROOT	Identifies the full pathname of the vmdaemon. The default is set to /usr/epoch/etc/vm.
VM_SYSLOGLEVEL	Sets the logging level. The default is concise, which logs only critical messages. **Note:** This setting is overridden at system startup.
VM_WATCHDOG_LMS	Enables the vmdaemon to monitor all Library Manager daemon (lmd) processes and to restart any that fail. The default is yes.
VM_CATALOG_DIR	Specifies the location of the volume and template catalogs. The default is /usr/epoch/etc/vm.
VM_ALLOW_DUP_BARCODE_IMPORT	Determines whether duplicate barcodes are allowed within a server. The default is no, which does not allow you to import a volume if the same barcode ID is already in the volume catalog. This ensures that all barcoded volumes remain unique within a server.
VM_ALLOW_DUP_SEQ_IMPORT	Determines whether duplicate volume sequence numbers are allowed within a server. The default is no, which does not allow you to import a volume if the same volume sequence number is already in the volume catalog. This ensures that all volume sequence numbers remain unique within a server.
VM_METRIC_INTERVAL	Specifies the frequency, in seconds, that the vmdaemon records metrics. Metrics enable you to gather performance results for use in trend analysis. For example, the vmdaemon could track mount faults once per hour and the data enables you to determine the peak of certain activities. The default is 60; the value is ignored, which indicates that no metrics are recorded.
VM_METRIC_EXPIRATION	Specifies the time period, in days, when metric data should be expired. The default is 33 days; this parameter is ignored.

Table C-1 Volume Management Configuration Parameters (Continued)

Parameter	Description
VM_LOCAL_ONLY_ACCESS	Specifies whether the vmdaemon (as an RPC server) can receive service requests from RPC clients on the network. Examples of RPC clients include: the EDM Library Unit Manager GUI, EDM Backup and HSM software, and volume management's CLI. The default is No.
VM_AUTH_TYPE	Sets the server authentication policy to RPC_UNIX, which makes the vmdaemon check user and group permissions for the session. This allows the vmdaemon to restrict functions to clients. A value of RPC_NONE disables checking of permissions.
VM_NEW_MEDIA_USR_ROUTINE	Provides a place holder for the user script that is executed in response to receiving an offline media request for available media. This user-specified routine is executed once for each media request. For example, a user can include sending email upon receiving the request in this routine.
VM_VOLFILE_DIR	For EMC internal use only. Specifies the pathname that contains pseudo media types. The default is /usr/epoch/etc/vm. Pseudo media types are created by using files on a traditional filesystem.
VM_CLOG_SIZE	Sets the maximum size of the vmdaemon debugging circular log (clog) file. The default is 10485760 (10 MB). The vmdaemon writes to this file while in debug mode. **Note:** Debug mode is enabled by default at system startup. **Note:** EMC Customer Service requires VM (and LM) clog files to debug a problem effectively. It may be necessary to increase the size of the clog file to prevent the vmdaemon from overwriting the contents of this file. **Note:** Setting the default to zero is not recommended; the circular log file will not have any size limitation, which can cause serious disk space issues. To run in debug mode, start the vmdaemon with the -d option or by sending a special RPC request to the vmdaemon. Once in debug mode, the vmdaemon writes to the clog file and continues to wrap until it reaches the maximum specified size. When the file reaches the maximum specified size, the vmdaemon writes to the top of the file.

Table C-1 Volume Management Configuration Parameters (Continued)

Parameter	Description
VM_ERASE_LIMIT	Specifies how many drives are allowed to perform volume erasures per optical library unit. **Note:** This parameter is ignored for tape media. Values include: NONE no limit to the number of concurrent volume erasures in a library unit. HALF_OF_DRIVES limits the number of concurrent volume erasures to half of the drives in the library unit. NUM_DRIVES (the default) limits the number of concurrent volume erasures to the number of drives in the library unit containing volumes.
VM_FIND_AVAIL_MEDIA_INTERVAL	Indicates that if a queued request exists, a search for available volumes from the catalog is made only after every *n* number of VM activities. (However, a search is done immediately after particular activities such as import, inject, or inventory.) The default value of *n* is 25.
VM_DUP_NUM_ACTIVE	Specifies the maximum number of concurrent duplications that can run on a system. The default is 1. The maximum should be no greater than half the number of drives that are available to the duplication.

Table C-1 Volume Management Configuration Parameters (Continued)

Parameter	Description
VM_DUP_STATE	Specifies whether media duplication is enabled or disabled. The default is enabled. This field appears only when its default value changes.
VM_DUP_TAPE_PAD	Specifies the amount of label padding applied to original volumes when duplication is enabled. The range is 1 to 10, where 1 is 10 MB of pad space and 10 is 100 MB of pad space. The default is 10. This field appears only when its default value changes.
LM_START : 0 LM_NAME: hp_c17xx_0 LM_HOST : edmdoc LM_EXEC_OPT : "" LM_EJECT_DEST : offline_0 LM_END : 0	Configuration parameters for each Library Manager configured for the server. All changes to this portion of vm.cfg are made by lmconfig. LM_NAME provides the name of the library unit in the form *manufacturer_library unit type_serial number.* LM_HOST specifies the name of the host on which the Library Manager daemon resides. The default is the localhost. LM_EXEC_OPT provides the options with which a particular Library Manager is started. The default is no value. The LM_EJECT_DEST specifies the name of the Library Manager that receives a volume when an eject occurs. The eject must always be initiated by clicking the Eject button in the EDM Library Unit Manager and not by the hardware eject button. The values are none, offline_0, and offsite_0.

Library Manager Configuration Files

The **lmconfig** utility creates a separate directory in /usr/epoch/etc/lm for each Library Manager that you configure. The name of each Library Manager follows a convention that is based on the type of library unit that it supports.

Library Manager Naming Convention

The Library Manager naming convention is of the form:

manufacturer_model_n

where:

manufacturer	Two- to three-character abbreviation that identifies the manufacturer of the library unit. For example, "hp" stands for Hewlett-Packard and "atl" stands for ATL Products.
model	Code (from two to five characters) that identifies the type of library unit. For example, atl_452 supports the ACL 4/52 library units with DLT drives manufactured by ATL Products.
n	One-digit suffix that lmconfig appends to the Library Manager name. The suffix for the first Library Manager is 0. This number increments by 1 for each Library Manager of the same type that you configure. For example, the first Library Manager for an ATL 4/52 DTL library unit is atl_452_0 and the second instance is atl_452_1.

The **lmconfig** utility copies a template configuration file, lm.cfg, into the subdirectory and modifies the file based on input that you provide interactively. **lmconfig** also creates a link to the executable file and adds the information about the new Library Manager to the Volume Manager's configuration file.

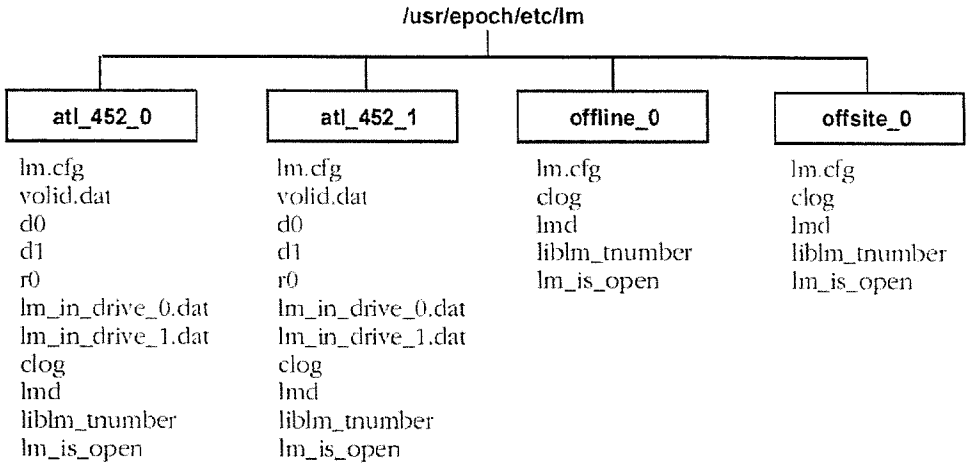
Library Manager Subdirectories

Within each Library Manager directory, lmconfig creates several files. During start-up, the Library Manager reads the files in its directory to initialize the library unit that it is managing and to set up its internal data structures.

Figure C-2 on page C-10 illustrates an example of the Library Manager directory structure. (Note that though the library unit in the example contains four drives, only two appear in the example, due to space limitations.)

Refer to Table A-3 on page A-19 for a description of the files that reside in each Library Manager directory.

Figure C-2 **Sample Library Manager Directory Structure**



Library Manager Configuration Parameters

Each Library Manager has a configuration file that contains one parameter and corresponding value per line. A delimiter separates each parameter from its value; at least one space appears before and after the delimiter as shown in the following example:

```
LM_NAME : atl_452_0
```

The configuration file contains parameters that define the name of the Library Manager, hardware addresses of the library unit and drives, and library unit operating features.

CAUTION: Do not edit the lm.cfg file manually. The lmconfig utility makes all modifications to Library Manager configuration files. If you need to make additional modifications to this file, contact EMC Customer Service for assistance.

Figure C-3 on page C-12 shows an example of the lm.cfg file. This is the default configuration file for the ATL 4/52 DLT library unit. (Note that comment lines begin with the # character.)

The lm.cfg file is set up during installation. When you change the hardware configuration by adding or removing a library unit, you need to reconfigure the software to recognize the change. For directions, refer to Chapter 17 "Configuring Library Managers".

Table C-2 describes the Library Manager configuration parameters and default values in the lm.cfg file.

Figure C-3

Sample Library Manager Configuration File

```
###generated by lmconfig###
#@@@begin_name@@@
LM_NAME : atl_452_0

#@@@end_name@@@

LM_INLET : 0
 LM_INLET_STATE : enabled
LM_END_INLET : 0

LM_INLET : 1
 LM_INLET_STATE : enabled
LM_END_INLET : 1

LM_INLET : 2
 LM_INLET_STATE : enabled
LM_END_INLET : 2

LM_INLET : 3
 LM_INLET_STATE : enabled
LM_END_INLET : 3

#@@@begin_other@@@
LM_VOLID_MAP : volid.dat
LM_DRIVE_EJECT_BEFORE_MOVE : 1
LM_BARCODE_CAPABLE : 1
LM_AUTO_INJECT : 1
LM_IES_ON_STARTUP : 0
LM_IES_ON_INVENTORY : 0

LM_SCAN_TIME : 5
LM_MAX_IDLE_TIME : 300
LM_MAX_RESIDENT_TIME : 7200
LM_MIN_RESIDENT_TIME : 120
LM_DRIVE_CLEAN_TIME : 400
```

```
LM_MOUNT_PRIORITY : 4
LM_DISMOUNT_PRIORITY : 2
LM_INJECT_PRIORITY : 3
LM_EJECT_PRIORITY : 5
LM_INVENTORY_PRIORITY : 12
LM_MOVE_MEDIUM_PRIORITY : 6
LM_WR_LBL_PRIORITY : 8
LM_RD_LBL_PRIORITY : 7

LM_LU_PHYSLOC : B1 lab

LM_CLEANER_BARCODE_RANGE : CLN*

#@@@end_other@@@
LM_MEDIA_FORMAT : EDM
#@@@begin_robot@@@
LM_LU : 0
LM_LU_BOARD : 3
LM_LU_BUS : 0
LM_LU_TARGET : 0
LM_LU_LUN : 0
LM_LU_PHYS_DEV : /usr/epoch/etc/lm/atl_452_0/r0
LM_END_LU : 0

LM_PICKER : 0
LM_PICKER_STATE : enabled
LM_END_PICKER : 0

#@@@end_robot@@@
#@@@begin_drive@@@
LM_DRIVE : 0
 LM_DRIVE_BOARD : 3
 LM_DRIVE_BUS : 0
 LM_DRIVE_TARGET : 1
 LM_DRIVE_LUN : 0
 LM_DRIVE_PHYS_DEV : /usr/epoch/etc/lm/atl_452_0/d0
 LM_MEDIA_TYPE : DLT
 LM_DRIVE_STATE : enabled
 LM_DRIVE_ATTR : lm_drive_dirty_query_able
 LM_IN_DRIVE_FILE : lm_in_drive_0.dat
LM_END_DRIVE : 0
```

```
#@@@end_drive@@@
#@@@begin_drive@@@
LM_DRIVE : 1
 LM_DRIVE_BOARD : 3
 LM_DRIVE_BUS : 0
 LM_DRIVE_TARGET : 2
 LM_DRIVE_LUN : 0
 LM_DRIVE_PHYS_DEV : /usr/epoch/etc/lm/atl_452_0/d1
 LM_MEDIA_TYPE : DLT
 LM_DRIVE_STATE : enabled
 LM_DRIVE_ATTR : lm_drive_dirty_query_able
 LM_IN_DRIVE_FILE : lm_in_drive_1.dat
LM_END_DRIVE : 1

#@@@end_drive@@@
#@@@begin_drive@@@
LM_DRIVE : 2
 LM_DRIVE_BOARD : 3
 LM_DRIVE_BUS : 0
 LM_DRIVE_TARGET : 3
 LM_DRIVE_LUN : 0
 LM_DRIVE_PHYS_DEV : /usr/epoch/etc/lm/atl_452_0/d2
 LM_MEDIA_TYPE : DLT
 LM_DRIVE_STATE : enabled
 LM_DRIVE_ATTR : lm_drive_dirty_query_able
 LM_IN_DRIVE_FILE : lm_in_drive_2.dat
LM_END_DRIVE : 2

#@@@end_drive@@@
#@@@begin_drive@@@
LM_DRIVE : 3
 LM_DRIVE_BOARD : 3
 LM_DRIVE_BUS : 0
 LM_DRIVE_TARGET : 4
 LM_DRIVE_LUN : 0
 LM_DRIVE_PHYS_DEV : /usr/epoch/etc/lm/atl_452_0/d3
 LM_MEDIA_TYPE : DLT
 LM_DRIVE_STATE : enabled
 LM_DRIVE_ATTR : lm_drive_dirty_query_able
 LM_IN_DRIVE_FILE : lm_in_drive_3.dat
LM_END_DRIVE : 3

#@@@end_drive@@@
###completed by lmconfig###
```

Table C-2 Library Manager Configuration Parameters

Parameter	Definition
LM_NAME : *name*	Name of the Library Manager. The LM_NAME appears next to the library icon in the Library Units and Drives area of the EDM Library Unit Manager window. The value is a character string that contains up to 16 characters.
LM_INLET : *n* LM_INLET_STATE : *state* LM_END_INLET : *n*	State of the inlet when the Library Manager starts up. The value is enabled or disabled. The relative inlet number is specified by LM_INLET and LM_END_INLET and must be the same value.
LM_VOLID_MAP : *file name*	Name of the file (volid.dat) that contains a table of the library unit's slot contents. The volid.dat file enables the Library Manager to start up without taking a complete inventory of the library unit.
LM_DRIVE_EJECT_BEFORE_MOVE : *n*	Determines whether hardware needs the volume to be ejected from the drive before the robot moves the volume. Values for *n* are 1 (enable, eject needed) or 0 (disable, eject is not needed).
LM_BARCODE_CAPABLE : *n*	Specifies whether the library unit supports barcodes. The value for *n* is 0 (no barcode support) or 1 (barcode support).
LM_AUTO_INJECT : *n*	Configures the library unit's inlet as automatic or manual. Values are: 0 = manual inlet and 1 = automatic inlet. A manual inlet (that is, hardware-controlled) requires the user to click the Inject button before the robot moves the volume from the inlet into the library unit. If the inlet is configured as automatic, the Library Manager polls the inlet and moves the volume into the library units without an explicit command. The time interval in which the inlet is polled is specified by the LM_SCAN_TIME parameter.
LM_NO_IES_ON_STARTUP : *n* OR LM_IES_ON_STARTUP : *n* LM_NO_IES_ON_INVENTORY : *n* OR LM_IES_ON_INVENTORY : *n*	Determines whether hardware checking occurs (e.g., obtaining the status of drives, slots, and inlets) at startup and during inventory. If the values of the parameters that contain "NO" are set to 1 or the values of the parameters that imply "YES" are set to 0, no hardware checking occurs.

Table C-2 Library Manager Configuration Parameters (Continued)

Parameter	Definition
LM_SCAN_TIME : *n*	Time interval (in seconds) that specifies how often the Library Manager polls its work list (which includes polling inlets, new requests, and cancellations); the default is 5 seconds . For automatic inlets, the inlet is polled continuously on this interval. For manual inlets, the inlet is polled when you click the Inject button.
LM_MAX_IDLE_TIME : *n*	Maximum time (in seconds) that a volume can remain in the drive after a dismount request is made. The default value for all drives is 300 seconds (five minutes).
LM_MAX_RESIDENT_TIME : *n*	Maximum time (in seconds) that a volume can remain in a drive before allowing preemption by a volume of the same priority. The default value for EO drives is 120 seconds (two minutes). The default value for tape drives is 7200 seconds (two hours).
LM_MIN_RESIDENT_TIME : *n*	Minimum time (in seconds) that a volume of a lower priority can be in a drive before allowing preemption for a volume of a higher priority. The default value is 120 seconds for tape (two minutes), 30 seconds for optical media.
LM_DRIVE_CLEAN_TIME : *n*	Designated time (in seconds) in which to clean a drive. The Library Manager starts verifying whether the cleaning completed after this time period elapsed. The default value is 300 seconds (5 minutes) or 400 seconds (over six minutes), depending on the type of drive and library unit.
LM_MOUNT_PRIORITY : *n*	Default priority for mount operations. The value is an integer in the range 1-16 (the default is 4) where 1 represents the highest priority.
LM_DISMOUNT_PRIORITY : *n*	Default priority for dismount operations. The value is an integer in the range 1-16 (the default is 2); where 1 represents the highest priority.
LM_INJECT_PRIORITY : *n*	Default priority for inject operations. The value is an integer in the range 1-16 (the default is 3); where 1 represents the highest priority.
LM_EJECT_PRIORITY : *n*	Default priority for eject operations. The value is an integer in the range 1-16 (the default is 5); where 1 represents the highest priority.
LM_INVENTORY_PRIORITY : *n*	Default priority for movement operations. The value is an integer in the range 1-16 (the default is 12); where 1 represents the highest priority.

Table C-2 Library Manager Configuration Parameters (Continued)

Parameter	Definition
LM_MOVE_MEDIUM_PRIORITY : *n*	Default priority for label write operations. The value is an integer in the range 1-16 (the default is 6); where 1 represents the highest priority.
LM_WR_LBL_PRIORITY : *n*	Default priority for label read operations. The value is an integer in the range 1-16 (the default is 8); where 1 represents the highest priority.
LM_RD_LBL_PRIORITY : *n*	Default priority for inventory operations. The value is an integer in the range 1-16 (the default is 7); where 1 represents the highest priority.
LM_LU_PHYSLOC : *string*	Physical location of the library unit, which the user enters while running lmconfig.
LU_CLEANER_BARCODE_RANGE : *string*	Cleaner barcode range. If the value is "N/A" or this parameter does not appear in the lm.cfg file, no assumptions are made for cleaner barcodes. If the value is "CLN*," any barcode that begins with "CLN" identifies a cleaner.
LM_MEDIA_FORMAT : *string*	Format of the backup data on the tape. The supported value is "EDM."
LM_LU : *n* LM_LU_BOARD : *n* LM_LU_BUS : *n* LM_LU_TARGET : *n* LM_LU_LUN : *n* LM_LU_PHYS_DEV: *path* LM_END_LU : *n*	Parameters between LM_LU and LM_END_LU (except for LM_LU_PHYS_DEV) that define the system board number, I/O bus slot number, SCSI target ID, logical unit number (LUN). All values are integers. LM_LU and LM_END_LU represent the relative library unit number and must be the same value. LM_LU_PHYS_DEV provides the full pathname (in a character string) of the physical device node for the library unit.
LM_PICKER : *n* LM_PICKER_STATE : *state* LM_END_PICKER : *n*	State of the robot (or robot) when the Library Manager starts up. The value is enabled or disabled. The relative robot number is specified by LM_PICKER and LM_END_PICKER and must be the same value.
LM_BARCODE_VERIFICATION : *value*	Specifies whether the barcode should be verified when a volume is mounted. The value is ignored.

Table C-2 Library Manager Configuration Parameters (Continued)

Parameter	Definition
LM_DRIVE : *n* LM_DRIVE_BOARD : *n* LM_DRIVE_BUS : *n* LM_DRIVE_TARGET : *n* LM_DRIVE_LUN : *n* LM_DRIVE_PHYS_DEV : *path* LM_MEDIA_TYPE : *value* LM_DRIVE_STATE : *value* LM_DRIVE_ATTR : *string* LM_IN_DRIVE_FILE : *file name* LM_END_DRIVE : *n*	LM_DRIVE and LM_END_DRIVE represent the relative drive number and must be the same value. LM_DRIVE_BOARD defines the system board number. LM_DRIVE_BUS defines the I/O bus slot number. LM_DRIVE_TARGET is the SCSI target ID. LM_DRIVE_LUN is the logical unit number (LUN). Other parameters are described below.
LM_DRIVE_PHYS_DEV : *path*	Provides the full pathname (in a character string) of the physical device node for the drive or robot.
LM_MEDIA_TYPE : *value*	Type of media that the drive supports. To configure a multifunction drive, specify one LM_MEDIA_TYPE parameter and value for each media type: DLT = digital linear tape cartridge DTF = digital tape format HITC_STK, HITC_MAGSTAR = half-inch tape cartridge EO = erasable optical disk cartridge WORM = write once, read many optical disk cartridge 9840s = ?
LM_DRIVE_STATE : *value*	State of the drive when the Library Manager starts up. The *value* is enabled or disabled.
LM_DRIVE_ATTR : *string*	Indicates whether EDM is to determine whether a drive is dirty. If this parameter is not set, EDM does not check the drives; you must then check the drives directly.
LM_IN_DRIVE_FILE : *name*	File name of the file that contains information about the contents of the drive. The default is lm_in_drive_*n*.dat, where *n* is the relative drive number. The drive content file is used during start up and is updated by the Library Manager each time a volume is moved into and out of a drive. If a drive content file does not exist for each drive, the Library Manager creates one during startup time.

Table C-2 Library Manager Configuration Parameters (Continued)

Parameter	Definition
LM_DRIVE_START_AFTER_MOVE : *n*	Indicates whether the drive needs to be explicitly started after a volume is mounted. The default value is 0, no explicit start needed. A value of 1 indicates explicit start.
LM_INJECT_TIMEOUT : *n*	Maximum time (in seconds) that the Library Manager waits for a volume to be inserted into the inlet before returning a timeout error. This parameter is used only for library units that have software control, which LM_INLET_UNLOCK_NEEDED specifies.
LM_ATTR: *value*	Defines the Library Manager; *value* is offline or offsite. This parameter applies only to Library Managers without physical library units.
LM_OFFLINE_MOUNT_ACTION : *value*	Defines the mount action to be taken upon receipt of a volume mount request. The value is: error, which automatically rejects the request, or queue, which holds the request in a queue until the request is satisfied or manually rejected. This parameter applies only to Library Managers without physical library units.
LM_OFFLINE_MOUNT_USR_ROUTINE : *path*	Specifies the pathname of a user routine that defines the mount action. For example, a user routine could be written to send a mail message to the operator when a volume request is made for an offline volume. This parameter applies only to Library Managers without physical library units.

The LM_INLET_IGNORE_ON_OPEN Parameter

The LM_INLET_IGNORE_ON_OPEN volume enables you to re-inject volumes that you just ejected into the library unit automatically, by just opening and closing the inlet. The default for this capability is 0:

LM_INLET_IGNORE_ON_OPEN : 0

When set to the default, this parameter does not appear in the lm.cfg file. However, you can set the parameter to 1, which removes this automatic re-injection feature. You must then remove media from the inlet and then close the inlet before ejected volumes can be re-injected.

To set the parameter to 1, add this parameter to the lm.cfg file manually, anywhere between "begin_other" and "end_other." For example:

```
#@@@begin_other@@@
LM_VOLID_MAP : volid.dat
LM_DRIVE_EJECT_BEFORE_MOVE : 1
LM_BARCODE_CAPABLE : 1
LM_AUTO_INJECT : 1
LM_IES_ON_STARTUP : 0
LM_IES_ON_INVENTORY : 0
LM_INLET_IGNORE_ON_OPEN : 1
.
.
.
#@@@end_other@@@
```

Offline and Offsite Library Managers

The offline and offsite Library Managers each has its own configuration file. Each Library Manager is described below.

Offline Library Manager

The offline Library Manager resides in /usr/epoch/etc/lm/offline_0. Figure C-4 shows the parameters that its configuration file contains. Refer to Table C-2 on page C-15 for a description of configuration parameters.

Figure C-4 **Offline LM Configuration File**

```
###generated by lmconfig###
#@@@begin_name@@@
LM_NAME: offline_0

#@@@end_name@@@
#@@@begin_other@@@
LM_SCAN_TIME: 5
LM_OFFLINE_MOUNT_ACTION: queue
LM_OFFLINE_MOUNT_USR_ROUTINE: /bin/true

#@@@end_other@@@
###completed by lmconfig###
```

Offsite Library Manager

The offsite Library Manager resides in /usr/epoch/etc/lm/offsite_0. Figure C-5 shows a sample configuration file. The parameter LM_ATTR indicates that the Library Manager is offsite, as opposed to offline. The parameter LM_OFFLINE_MOUNT_ACTION is described in Table C-2.

Figure C-5 **Offsite LM Configuration File**

```
###generated by lmconfig###
#@@@begin_name@@@
LM_NAME : offsite_0

#@@@end_name@@@
#@@@begin_other@@@

LM_ATTR : offsite
LM_OFFLINE_MOUNT_ACTION: error

#@@@end_other@@@
###completed by lmconfig###
```

D findxcpio Directives

The work item directive specifies which filesystems, directories, and files to back up on the client, and which to exclude. EDM Backup's autoconfiguration feature builds these directives for you automatically.

When backups are run, all directives, which can consist of macros, are translated into the expanded **findxcpio** syntax; the **findxcpio** program scans the client filesystem and reads the client data. (Refer to the **findxcpio** man page for detailed information about the command.)

This chapter explains the **findxcpio** macros and expanded syntax.

- Work Item Directive
- Logical Operators
- Macros
- Syntax to do Back Up
- Syntax to not Back Up
- Evaluation Shortcuts

Work Item Directive

You can use the Work Item tab in the EDM Backup Configuration window to adjust the specification for the directive(s). The interface builds the directives for you (with macros). In addition, you can also directly specify the **findxcpio** directive in the Work Item Options window which is accessed through the Work Item tab in the EDM Backup Configuration window. (You can also edit the directives in the eb.cfg configuration file.)

The general format of the work item directive is:

```
work item: "work item name", "client name"
{
"files to back up";
"other statements";
}
```

This statement has three fields:

- *Work item name*: specifies a unique work item that indicates the client's name and perhaps a set of files to be backed up.
- *Client name*: specifies the client name.
- *Files to back up*: specifies the client's files that you want to back up. Certain **findxcpio** qualifiers can be used after the specifying file names, to further refine which files are to be backed up.

Logical Operators

The **findxcpio** qualifiers include logical operators that enable you to expand the file specifications with evaluation statements. These operators are:

- **-o** (or)
- **!** (not)
- **-a** (and)

The **-a** operator is not required; it is implied when two or more evaluation statements occur in a row.

Macros

EDM Backup provides a set of macros to use in place of the **findxcpio** syntax. The macros simplify specifying what files to back up and which to skip. They are defined in the **startfind** script.

The **findxcpio** command uses arguments that are similar to the Unix **find** command. Therefore, all "DO..." macros must be positioned before other macros, such as "PRUNE..." macros.

Note: Simpler representations of these macros are available in the Work Item tab of the EDM Backup Configuration window.

Table D-1 lists basic macros and their expanded **findxcpio** syntax. In these statements, substitute the name of a filesystem for *fs*.

Table D-1 **Basic findxcpio Macros**

This Macro...	Expands to this findxcpio Syntax
ROOTDIR	"/"
DO_FS *fs*	_fs
DO_PATH *fs*	_fs
DO_DIR *fs*	_fs
DO_FILE *fs*	_fs
PRUNE_PATH *fs*	"\(-path", *_fs*, "-prune -o -true \)"
PRUNE_DIR *fs*	"\(\! -name", *_fs*, "-prune -o -true \)"
PRUNE_FILE *fs*	"\(\! -name", *_fs*, "-prune -o -true \)"
LOCAL_FS_ONLY	"-xdev"
NO_NFS	"\(-fstype nfs -prune -o -true \)"

Each of the following examples shows how to use the macros that are listed in Table D-1 in a work item directive:

- To back up the root (/) filesystem, you enter the work item:
```
work item: "cad1-all", "cad1", ROOTDIR;
```
- To back up the /home filesystem and all files and directories under it, you enter the work item:
```
work item: "cad1-all", "cad1",
DO_PATH("/home");
```
- To skip any files in /tmp, you enter the work item:
```
work item: "cad1-all", "cad1",
PRUNE_PATH("/tmp");
```
- To back up all filesystems in the root (/) filesystem and to skip any NFS files, you enter the work item:
```
work item: "cad1-all", "cad1",
DO_PATH("/"),NO_NFS;
```
- To back up all filesystems in the root (/) filesystem, and to skip any files named core, you enter the work item:
```
work item: "cad1-all", "cad1",
DO_FS("/"),PRUNE_FILE("core");
```
- To back up only files in a particular filesystem (for example, /usr), you enter the work item:
```
work item: "cad1-all", "cad1",
DO_FS("/usr"),LOCAL_FS_ONLY;
```

Compound Macros

Combining the macros in Table D-1, EDM Backup provides the following compound macros.

Table D-2 Compound findxcpio Macros (1)

This Macro...	Expands to this findxcpio Syntax
NO_TMP_FILES	PRUNE_PATH ("/tmp"), PRUNE_FILE ("*~"), PRUNE_FILE ("\#*")
NO_AUTOMOUNT	PRUNE_PATH ("/net"), PRUNE_PATH ("/tmp_mnt"), PRUNE_PATH ("/nfs")

Each of the following examples shows how to use the macros that are listed in Table D-2 in a work item directive:

- To back up files in the root (/) filesystem, and to skip files in the temporary directory (/tmp), files that end with a tilde (~), and files that start with a pound sign (#), you enter the work item:

```
work item: "cad1-all", "cad1",
DO_PATH("/"),NO_TMP_FILES;
```

- To back up files in the root (/) filesystem, and to skip any files in the /net, /tmp_mnt, or /nfs directories, you enter the work item:

```
work item: "cad1-all", "cad1",
DO_PATH("/"),NO_AUTOMOUNT;
```

EDM Backup also provides additional compound macros that combine the macros that Table D-1 and Table D-2 contain. The following table lists the five compound macros and shows their expanded **findxcpio** syntax.

Table D-3 Compound findxcpio Macros (2)

This Macro...	Expands to this findxcpio Syntax
ROOT_ONLY	DO_PATH("/"), LOCAL_FS_ONLY
LOCAL_DISK	DO_PATH("/"), NO_AUTOMOUNT, NO_NFS
SYSTEM_FILES	DO_PATH("/ /usr"), NO_AUTOMOUNT, LOCAL_FS_ONLY
USER_FILES	DO_PATH("/home"), NO_TMP_FILES, LOCAL_FS_ONLY
LOCAL_FILES	DO_PATH("/"), NO_NFS

Each of the following examples shows how to use the macros that are listed in Table D-3 in a work item directive:

- To back up only local files in the root (/) filesystem, you enter the work item:
  ```
  work item: "cad1-all", "cad1", ROOT_ONLY;
  ```
- To back up all filesystems on a client's local disk, and to skip backing up any automounted or NFS filesystems, you enter the work item:
  ```
  work item: "cad1-all", "cad1", LOCAL_DISK;
  ```
- To back up two local filesystems, root (/) and /usr, and to skip any NFS-mounted filesystems, you enter the work item:
  ```
  work item: "cad1-all", "cad1", SYSTEM_FILES;
  ```
- To back up only the local filesystem and to skip any temporary files, you enter the work item:
  ```
  work item: "cad1-all", "cad1", USER_FILES;
  ```
- To back up all filesystems on the local disk, and to skip any NFS filesystems, you enter the work item:

```
work item: "cad1-all", "cad1", LOCAL_FILES;
```

Syntax to do Back Up

The **findxcpio** command options makes it easy to tell EDM Backup to search for certain types of files for backup.

When specifying a client backup list, the simplest backup file specification is "/" – which means to start at the top of the filesystem and back up all files and directories. In addition to "/" you can specify other qualifiers to select or deselect files.

For example, to specify to have the backup program back up only files it finds under "/" that are .c files, you use the **-name** option:

```
work item: "cad1-all", "cad1", "/ -name '*.c' ";
```

This file specification checks for all .c files. When EDM Backup locates .c files, it backs them up. When EDM Backup finds files that are not .c files, it passes over them. Note the use of single quotes around the *.c expression. The quotes are required because the asterisk (*) is a special character to the shell and the quotes prevent the * from being expanded prematurely.

Suppose you want EDM Backup to copy the files that are stored on a fileserver that belong to a particular user. You use the **-user** option with the name of a user (karen):

```
work item: "atlas1", "disk1-all", "/ -user karen";
```

This file specification checks for all files under the / directory that karen owns, and backs them up. EDM Backup passes over all files that the user karen does not own.

Similarly, to select files that belong to a particular group, you use the **-group** option. To back up all files that the doc group owns on the fileserver atlas1, you enter:

```
work item: "atlas1", "disk2-all", "/ -group doc";
```

This file specification checks for all files under the "/" directory owned by members of the doc group, and backs them up. EDM Backup passes over all files that members of group doc do not own.

To select files for backup that contain a certain number of blocks and that have been accessed within a certain number of days, use the **-size** and **-atime** options. For example, to select files that contain 30,000 blocks (512 bytes each) and were accessed in the last 72 hours, you enter:

```
work item: "cad1-all", "cad1", "/ -size 30000 -
atime -3";
```

This file specification checks for files under the "/" directory that contain 30,000 blocks and were accessed within the last 72 hours (specified by the value -3 because each 24-hour period is represented by a value of 1) and backs them up. EDM Backup passes over any other files.

To select a certain type of file for backup that was changed within a certain number of hours, use the **-type** option and the **-ctime** option. For example, to select symbolic links (**l**) that were modified within the last 48 hours, you enter:

```
work item: "cad1-all", "cad1", "/ -type l -ctime -
2";
```

This file specification searches for all symbolic links that were modified in the past 48 hours (specified by the -2 because each 24-hour period is represented by a 1) and backs them up, passing over any other files.

On an HSM system, to select only staged files (files with a staging ID #1 filled in), use the **-staged** option:

```
work item: "cad1-all", "cad1", "/ -staged";
```

Syntax to not Back Up

The **findxcpio** command options make it easy to tell EDM Backup to exclude certain types of files from the backup list.

For example, if you want to add a check so that EDM Backup does not back up a client's NFS filesystems, you add the evaluation for the filesystem type NFS using the **-fstype** and **-prune** options. The **-fstype** option directs EDM Backup to search for a particular filesystem type. The **-prune** option directs EDM Backup not to descend into subdirectories, but continue evaluating other filesystems for backup. To direct EDM Backup not to copy NFS filesystems under the "/" directory you enter:

```
work item: "cadl-all", "cadl", "/ \( -fstype nfs -prune -o -true \)";
```

Note: The use of **-fstype nfs -prune** is not recommended, because it is impossible to prevent an occasional descent into an NFS filesystem. The better approach is to specify individual filesystems, each with the **-xdev** option.

This file specification checks for NFS filesystems, and when EDM Backup finds an NFS filesystem (*true*) then the evaluation continues to the second statement, which is **-prune**. **-prune** always evaluates to *true* and causes the search to stop at the NFS filesystem mount point, and to skip over it. If the files are not NFS (*false*), the evaluation proceeds to the second statement (**-o -true**), which evaluates to *true* and directs EDM Backup to copy the files.

If your site uses automount, and you find that you have timeout problems using the previous file specification, use this syntax:

```
work item: "cadl-all", "cadl", "/ \( -path /net -prune -o -path /nfs -prune -o -
path \ /tmp_mnt -prune \) -o -true";
```

Note: Although this line appears as multiple lines in this example, it must be specified on one line in the configuration file.

This file specification checks for files in three paths (in this example, /net, /nfs, and /tmp_mnt). When EDM Backup finds one of these paths (*true*) then the evaluation continues to the second statement (**-prune**). **-prune** always evaluates to true and causes the search to stop at the specified path and skip over it.

Suppose you do not want to back up a client's /tmp and /usr/tmp directories in the "/" directory. To add checks for these directories you use the **-path** option to specify the pathnames to exclude. You specify the **-o** option (meaning *or*) to direct EDM Backup to exclude either directory:

```
work item: "cad1-all", "cad1", "/ ( -path /tmp -o -path /usr/tmp \) -prune -o -
true";
```

This file specification verifies whether the directory is /tmp or /usr/tmp. If the directory is neither (*false*) the evaluation stops and EDM Backup copies the file to the backup. If the directory is /tmp or /usr/tmp (*true*) then the evaluation goes to the second statement **-prune**, which always evaluates to *true* and causes the search to stop at the /tmp or the /usr/tmp directory.

Suppose that in addition to not backing up the /tmp or /usr/tmp directories, you do not want to back up editor files and core files. To specify this, you use the **-name** option to add checks for editor files (*~) or core files:

```
work item: "cad1-all", "cad1", "/ (-path /tmp -o -path /usr/tmp \) -prune -o ! (-
name '*~' -o -name core)";
```

The first part of the file specification, as explained in the previous example, checks whether the directory is /tmp or /usr/tmp, and does not copy the contents of the directory if it is either directory. The second part of the file specification checks for files that have the name *~ or core (**-name**). This statement instructs EDM Backup that if the files are not editor backup files (*~) or core files (*true*) then back them up. If the files are one of these (*false*), do not back them up.

Suppose you want to instruct EDM Backup not to cross filesystem boundaries, which excludes from backup any filesystems that are not explicitly listed. You can use the **-xdev** option for this purpose:

```
work item: "atlas1", "disk1-all", "/ /usr /homes -
xdev";
```

Note: If NFS timeouts cause backups to fail, try using the **-xdev** switch.

This file specification checks for the specified filesystems (/, /usr, and /homes) and instruct EDM Backup not to cross filesystem boundaries, and so, to only back up the listed filesystems. Because the file specification includes the "/" filesystem, if the **-xdev** switch is not included, EDM Backup backs up everything in the namespace, including NFS-mounted filesystems.

Evaluation Shortcuts

In certain cases, the **findxcpio** evaluation process can skip parts of the file specification in the work item directive, saving time and preventing unwanted side-effects. The **findxcpio** program saves time by quickly eliminating directories and files that are specified for exclusion from the backup list. In doing so, the program avoids unwanted side-effects because it does not act upon the second half of the expression.

Here are the two cases when **findxcpio** does not bother with the second half of a directive.

False and

In directives with an *and* in the evaluation, if the first statement evaluates to *false*, **findxcpio** short circuits the evaluation and ignores the second half of the directive (**-prune**).

Consider this work item directive that specifies not to back up a client's /tmp and /usr/tmp directories:

```
work item: "cadl-all", "cadl", "/ \(-path /tmp -o -path /usr/tmp \) -prune o -
true";
```

In the first part of this directive that contains the implied *and*, when **findxcpio** finds that a directory is not /tmp or /usr/tmp (*false*) then **findxcpio** short circuits and does not evaluate the **-prune** option. On the other hand, if the directory is /tmp or /usr/tmp (*true*) then **findxcpio** evaluates the **-prune** option. (The **-o -true** statement directs EDM Backup to copy files that are not /tmp or /usr/tmp.)

True or

In directives with an *or* evaluation (**-o**), if the first statement evaluates to *true*, **findxcpio** short circuits the evaluation and does not evaluate the second half of the directive. Thus, in the following example, if the directory is /tmp (*true*) then **findxcpio** does not check for the second type of files (/usr/tmp), but goes directly to the **-prune** option:

```
work item: "cadl-all", "cadl", "/ \(-path /tmp -o -path /usr/tmp \)-prune";
```

Glossary

Access Control List (ACL) Provides an enhanced level of security for UNIX files. An ACL extends the standard UNIX permission settings beyond owner, group, and other. An owner of a file can permit or deny access to specific users and groups.

allocation request Request for a volume sent by an application. The volume characteristics are specified in the accompanying volume template.

archive setting Sample HSM watermark setting that is intended for filesystems whose files are written once and rarely, if ever, read. The filesystem's data will typically be staged-out and rarely, if ever, staged back in. This would be the case if large amounts of data are gathered every day and quickly "archived" off of the magnetic disk. Other sample watermark settings include cached setting and random setting.

autochanger Robotic mechanism inside a library unit that physically moves media into and out of slots and drives. Sometimes referred to as a "picker" or "robot."

automatic scheduling Function that automatically schedules incremental backups as well as some full backups in order to back up each work item each night. It provides a full backup of each work item once within the rotation period. It attempts to distribute the work so that each night's backups will operate for approximately the same length of time. See also custom scheduling.

backup activity monitoring Allows viewing and management of active, successful, and failed work items through the EDM graphical user interface.

Backup Activity Wizard Enables you to start new, queued, or failed backups, stop running backups, or manage the backup queue. Access this wizard from the EDM Main window.

backup catalog Group of related files that maintain a continuing backup history. A catalog identifies a backup at the file level by recording the names and attributes of each file on the client system at the time of the backup. Backup catalogs also keep track of the location of backup data for each file that was selected for backup.

backup catalog delta Contains a condensed backup catalog with information that differs only from the previous backup catalog files.

backup configuration Set of parameters on the backup server used to define what data gets backed up, when it gets backed up, to where it is backed up, how backups are processed, and who can run backups and restores. These parameters are edited through the Backup Configuration window and stored in the /usr/epoch/EB/config/eb.cfg file.

Backup Configuration window Window in the EDM graphical user interface for editing the backup configuration.

Backup Configuration Wizard Enables you to configure a network, Symmetrix Path, or Symmetrix Connect backup of filesystems or a database. It supports all clients. You access this wizard through the Main window of the EDM GUI. It leads you step-by-step through the configuration process.

backup levels 1–9 Specifies a backup in which EDM Backup copies only those files that changed since the last backup of a lower level.

backup media Media for storing backup data. Parameters for the backup media are specified in the trailset and trail of the backup configuration.

backup saveset EDM Backup creates a saveset record for each work item it backs up. A saveset record contains the template name, work item name, the backup level, start and completion times, expiration times, and the backup trail. The saveset record is used to find the volume containing the backup data and the associated backup catalog.

backup saveset record Data saved on backup media from a single backup of a single work item.

backup schedule template Specifies all the information about how to perform a backup. It includes the work group(s) to backup, the rotation period and backup shift lengths, the trailsets on which to store the backup data, and the backup schedule that dictates a backup level for each day. See also template.

backup server EDM server on a network that contains the client, work item, media, schedule, and server configuration information.

backup shift Parameter in the template of the backup configuration. It specifies the desired amount of time for backups to run in each 24-hour period.

backup trailset Also called media set. Defines the media trails to which the backup data is sent and the type of media to use. It also defines how long to save the backup data and its associated elements. See also trailset.

bad file File that changed during backup or a file that is corrupt. EDM Backup tries three times before marking a file bad.

baseline backup With baseline backups, you back up all of your most stable files, which, at minimum, consist of all the files that are staged out to the staging media. From that point on, you perform backups relative to the baseline; that is, the baseline backups take care of the data that is staged out, while the regular backups take care of everything else.

bitfile Uninterpreted stream of bytes that contains the staged-out portion of a file. A single bitfile can hold the contents of a single client file or the contents of multiple files. A bitfile is uniquely identified by a *bitfile ID* and a *store ID*.

bucket When EDM Migration stages out a file, it logically divides the file into a number of segments known as buckets, which can then be individually accessed.

bulk staging In HSM, bulk staging reduces each filesystem's magnetic disk utilization to a predefined low watermark (LWM). Bulk staging is another name for periodic staging.

cached setting Sample HSM watermark setting intended for filesystems in which reads outnumber writes, and a relatively predictable set of files are read. This setting takes advantage of migration's ability to keep the most recently-accessed files on magnetic disk, thus ensuring optimal performance. Other sample watermark settings include archive setting and random setting.

catalog See backup catalog and volume catalog.

cataloged backup Method of backup that updates the system administration database with information about the backup (i.e., the name of the template and the volume ID of the backup volumes).

client Workstation or fileserver on a network that accesses the EDM server to back up and restore filesystem and database data, and optionally, migrate files.

client software See local client software and remote client software.

client store In HSM, a collection of files that have migrated from a single network client to the EDM server. The client store can reside within any stageable filesystem on the EDM fileserver. Every client store is associated with a *store ID* and a *bitfile ID*.

compaction In HSM, the process of eliminating stale space on volumes in a staging trail and consolidating the staged files onto the minimum number of necessary volumes. Compacted volumes can then be erased and reused.

configuration See backup configuration.

cross-client restore User-initiated restore of their own backed up files on one client to their own directory on a different client.

custom scheduling Explicitly schedule backups for particular days of the week, month, or other schedule period. (As opposed to using automatic scheduling, which schedules backups using general parameters and processing algorithms.)

data access pattern Refers to the frequency in which staged data is accessed. Data access patterns include three categories: archive, random-retrieve, and general purpose.

database work item Specifies which client databases you want to back up. You can specify which filesystems, directories, files, and raw partitions to include or exclude for backup. See also work item.

day of rotation Rotation option within custom schedule that lets you schedule a period that is not a multiple of 7 days.

demand staging Stage-out that occurs when the high watermark is reached.

device node Special file, located in /dev, that acts as a pointer to a device driver. It associates a location, type, and access mode with a physical device.

disaster recovery Recovery procedure for when the backup server's own disks crash. Also applies to crashed disks on network clients. In both cases, some EDM software might have been lost, requiring extra work before performing the data recovery with EDM Backup Restore window.

domain In the GUI, reports can be designed and run for the local EDM or for an EDM domain of multiple EDMs. A domain consists of a domain master EDM machine and multiple EDM machines who agree to participate.

EDM (EMC Data Manager) EMC's hardware product for use as the backup server. Provides network backup and restore with automated management of media. Contains the EDM Backup software and optional HSM software.

EDM Backup EMC's software module for network backup and restore. Its interfaces include the EDM Backup Configuration window and the EDM Restore window.

EDM Backup client Workstation or filesystem on a network that accesses the server to backup and restore files. See also remote client software.

EDM HSM EMC's distributed hierarchical storage management application. The product consists of several software modules that support local and network migration.

EDM Migration EDM Migration provides migration services between an EDM server and peripheral devices, such as optical or tape library units. It also provides HSM services for other file servers and workstations on the network.

EDM transfer protocol The connection method, under control of the **edmlinkd** daemon, used by EDM for installing and communicating with supported clients. On supported clients (see the current *EDM Release Notes*) this replaces use of remote shell.

EDM Volume Management Underlying software of the EDM Library Unit Manager interface that manages volume allocation, drive scheduling, and tracks all removable media for EDM Backup and optional HSM applications. See also Volume Manager and Library Unit Manager.

EMC Data Manager (EDM) EMC's hardware product for use as the backup server. Provides network backup and restore with automated management of media. Contains the EDM Backup software and optional HSM software.

emxattr file HSM extended attribute file. A file used by HSM that contains information about files that have been staged out.

erasable optical (EO) disk Rewritable storage medium that uses laser technology to write data onto the disk. Also referred to as a magneto-optical disk.

event-driven staging Method of staging that reduces a filesystem's magnetic disk utilization to a predefined low watermark. Event-driven staging occurs automatically when a filesystem reaches a predefined high watermark (HWM).

expire backups Process that enables old data stored on backup media to be overwritten with new data, which includes deleting online catalogs from the backup server's disks.

expire catalogs Process that deletes online catalogs from the backup server's disks, which can be done with or without expiring backups.

expired media "Expired" is the media state that signifies a piece of media has exceeded its maximum number of uses.

explicit staging Method of staging that is initiated manually by users who want to selectively stage out one or more files as a group.

fencepost Portion of a file that remains on magnetic disk after the first stage out.

file restore Copies a client's backup files from the backup server's media to the client's disk.

filesystem Contains the files and directories on each individual disk partition. The "filesystem" refers to the overall system directory tree that merges these filesystems into a single hierarchy.

filesystem backup Backup of filesystems over the network, using core EDM Backup functionality. Backup of data designated by filesystem work items.

filesystem work items Defined unit of data to be backed up, consisting of one or more filesystems. Each work item is uniquely named and specifies the filesystems to be backed up.

full backup Copies all the scanned *client* files, independent of the time of their last backup or their location, to the *backup server*.

green zone Disk utilization level that is between the low and high watermarks. The green zone should be large enough to hold the average number of disk blocks used in a day including both new files and previously inactive (staged-out) files that are accessed (staged-in).

Hierarchical Storage Management (HSM) Collection of techniques used to effectively manage a hierarchy of storage media such as RAM, magnetic disks, optical disk and tape. HSM uses techniques such as attempting to keep the most frequently accessed data on the highest speed media (highest speed usually implies highest cost), less frequently accessed data on the next highest speed media, continuing with this model until the least frequently accessed data is on the lowest speed and cost media.

high watermark (HWM) Preconfigured disk utilization level that, when reached, causes HSM to immediately stage out enough files to secondary storage to reach the low watermark (LWM).

import Method of moving volumes among servers. The volume management import process reads the electronic volume label and adds it to the volume catalog of the receiving server.

incremental backup Backup method that copies only those client files that have changed since the previous backup of any level.

inode UNIX file's directory information, for example its attributes or meta-data.

keyboard focus Indicates the window or element within a window that receives keyboard input.

labeled volume Media that has been given a volume label.

library unit Robotic library unit that automatically manages the placement of cartridges. Most library units are equipped with an inlet to insert and eject media, robotics to physically move media, one or more internal drives, internal storage slots, and in some models, a barcode scanner.

Library Unit Manager Process that manages volumes located in physical library units and offline and offsite locations. A Library Unit Manager manages drive scheduling, volume mounts and dismounts, volume injects and ejects, and library unit inventories. See also offline_0 and offsite _0.

Library Unit Manager window Part of the EDM graphical user interface that allows administrators to label, allocate, and acquire information about all volumes in use for backup and, optionally, HSM. Started from the EDM Main window.

life cycle of media See volume life cycle.

local client software Software located on the backup server that scans its disks and copies the data for backup. See also remote client software and server software.

local migration Staging of filesystems from the EDM server to a tape or optical library. See also network migration client.

logical data Data that is identified either at the file level (filesystem data) or as a database entity.

logical unit number (LUN) Last part of a SCSI address (channel, target ID, LUN). LUNs are numbered 0 - 7.

low watermark (LWM) Level to which HSM lowers filesystem utilization as the result of a demand staging run.

manual backup Schedules backups from the command line using the **ebbackup** command and the names of one or more work items or work groups.

maximum concurrent backups Backup configuration parameters for limiting concurrent processing of work items at various points in the system. There is such a parameter for: the server software as a whole, each trail, local client software, and each remote client software (which applies to network backup of filesystems only).

media duplication Feature of the EDM server that enables you to create a duplicate set of backup media automatically after each backup session.

media list Displays information for each volume that the Library Unit Manager contains. By default, the media list includes the library unit name, drive, slot number, and volume information (name, barcode, and sequence number), and status of volume scheduling.

media rotation For each trail, a new tape cartridge is started at the beginning of a new rotation period. This way, a set of tapes is created for each rotation period that just holds data from that period of time. Each such instance of the trail is called a media rotation.

media set Set of media. See trailset.

media type Type of physical storage medium such as digital linear tape (DLT) cartridge.

meta key User-definable key that you can map to any key on your keyboard. Most X window applications include a default mapped Meta key. Use the **xmodmap** command to display the key map for your keyboard.

migrated data Data that HSM has moved from one location to another. Other terms used are staged data or staged image.

migration Process of automatically or manually moving data from magnetic disk to secondary storage. Migration is synonymous with staging.

migration server EDM with HSM option. Contains the client, work item, media, schedule, and server configuration information. In addition, the Migration Server contains specific watermark information on when to stage files out from local storage to other storage media (e.g., optical or tape storage).

network backup Backup of filesystems over the network, using core EDM Backup functionality. Backup of data designated by filesystem work items.

network migration client Workstation or fileserver on the network that has data managed by EDM Migration software.

obsolete work items After autoconfiguration, work items (filesystem work items) that no longer validly designate a current filesystem or a raw partition. Backup of these work items will fail if they are not moved out of a work group and assigned to a template.

offline_0 Offline Library Manager (offline_0) keeps track of volumes that are located outside a physical library unit, usually in a nearby storage rack or shelf. A volume logically enters the offline Library Manager when you eject a volume from a physical library unit.

offsite backup Concept of storing backed-up data in a location outside of the building boundaries or the EDM Backup server.

offsite _0 Volumes that are located in the offsite Library Manager (offsite_0) represent those volumes that are located beyond the building's boundaries, such as an offsite archival location. A volume logically enters the offsite Library Manager when you eject a volume from a library unit or the offline Library Manager.

optical disk Less expensive storage medium that uses laser technology to read and write data. Two types of optical disks are: *WORM* (write once read many) disks and *EO* (erasable optical) disks.

PC work item Specifies the PC (NetWare, Windows NT, or OS2) or OpenVMS client data you want to back up. You can specify which directories and files to include or exclude for backup. See also work item.

periodic staging Scheduled filesystem staging runs that are set via **crontab** to return disk utilization to the low watermark. Periodic staging is another name for bulk staging.

pop-up menu Menu that opens when you place the pointer over an object and click mouse button 3. The pointer changes to an icon if a pop-up menu is available for that object. Pop-up menus appear in the browser of the Main window and the Library Units and Drives area of the Library Unit Manager window.

port control Allows you to control the TCP ports used by the EDM to communicate with clients on the other side of a firewall.

prestage reserve Used for files that have been staged out, but also remain on the system's magnetic space. This magnetic space can be released quickly if disk utilization crosses the HWM. To allow filesystem usage to return to the LWM during a demand-staging event, the prestage reserve is typically the same size, or slightly larger, than the green zone. See also *working set*.

prestage watermark (PSWM) Predefined level at which HSM begins to stage files out to secondary storage. The prestaged files still reside on magnetic disk. See also low watermark (LWM) and high watermark (HWM).

prestaging Process in which files are written to secondary storage but their space on magnetic disk is not released. To minimize staging delays, HSM anticipates staging requirements and prestages additional files to allow the magnetic filesystem utilization to be lowered quickly if the HWM is crossed or if a demand staging run is necessary.

primary storage Main location, usually magnetic disk, for filesystem data storage. Magnetic disk storage is an example of primary storage and digital linear tape (DLT) is an example of secondary storage.

primary trailset Because of the alternate night scheduling feature, it is possible for each template to have two trailsets. Therefore, even when you do not use alternate night scheduling and there is the only trailset, you will see it labeled **Primary trailset**. In addition, the name of the default trailset is "primary".

random setting Sample watermark setting intended for filesystems where reads outnumber writes, but where the access pattern is random and least-recently-used caching is ineffective. This would be the case, for example, in a government records office, where several files must be read in from staging media in order to analyze a new file. When the analysis is completed, there is no need to keep the files on magnetic disk, because the files won't be accessed again for an undetermined period of time. You can select this setting for filesystems that match this random data access pattern. Other sample watermark settings include, archive setting and cached setting.

raw partition Special file, located in /dev, that acts as pointer to a device driver. It associates a location, type, and access mode with a physical device.

red zone Area on magnetic disk reserved for processes with root privilege. This area is used to expand system log files and other system files when the filesystem is full. The red zone only exists on systems that support minfree.

Reliability Agent Scanner Daemon (RASD) Functionality that actually monitors the EDM system; it includes the rasd script and rasd configuration files.

remote client software Software located on client which performs network backup of filesystems on the client. Windows NT, NetWare, and OS/2 backup client software must be installed on the client platform. See also local client software.

Remote System Monitor (RSM) Software that polls the rasd_alert file, notifying Customer Service Database when any significant events are detected.

Report window Part of the EDM graphical user interface that allows users to run reports on the local EDM or on many EDMs in a designated domain. Reports can be set to run automatically and can be sent to a printer, a file, or an e-mail address. Started from the EDM Main window.

restore Copies a client's backup files from the backup server's media to the client's disk. See Restore window.

Restore window Graphical user interface for restoring backed up data. Started by selecting Restore from the EDM window or typing **edmrestore** on the server's command line. Also for administrator use, it is not limited to user-initiated restore from clients of their own files back to their own client. If you have administrator permissions, you can also change destination directories and clients. See also cross-client restore and root restore.

root restore Restore of any backup files or database information belonging to any user on the client to any directory on the same client. Suitable for a system administrator of a single host. See also cross-client restore and self-service restore

rotation period Backup configuration parameter in the schedule template. The period of days during which a full backup will be performed for each work item covered by a template (for automatic scheduling). For custom scheduling, it's the schedule period.

saveset record Data that is saved on backup media from a single backup of a single work item. A saveset record contains the template name, work item name, the backup level, start and completion times, expiration times, and the backup trail. The saveset record is used to find the volume containing the backup data and the associated backup *catalog*.

schedule In backup configuration, a template is set up to specify the scheduling of backups and the use of media. See template.

schedule period Backup configuration parameter in the template. It's the rotation period for automatic scheduling. For custom scheduling, it's the number of days in the custom schedule. See also rotation period and custom scheduling.

secondary storage Storage medium, such as a DLT cartridge, used as a backing store for the filesystem. See also primary storage.

self-service restore User-initiated restore from UNIX clients of their own files back to their own client and directory. See also cross-client restore and root restore.

server See backup server or migration server.

server software EDM Backup, Volume Management, and optional HSM software located on the EDM server. This software configures, initiates, and controls backups, restores, and data migration. See also remote client software and local client software.

stage in Movement of data from secondary storage to magnetic disk.

stage out Movement of data from magnetic disk to secondary storage.

stageable filesystem Filesystem configured for migration. A stageable filesystem is sometimes referred to as a "filesystem under migration control."

stage-in daemon Process that stages in files or deletes bitfiles when a staged file is modified.

staging In HSM, the process of moving files from one level in the storage hierarchy to another; for example, from local storage to the EDM server or from magnetic disk to optical disk. Also referred to as *migration*.

staging targets Destination for migrated data. Destinations include volumes, staging media, staging devices, and stores.

staging template File that contains staging parameters for one or more filesystems. Each filesystem is associated with one staging template and each staging template can be used by several filesystems.

staging trail One or more volumes that contain staged data for a particular filesystem or group of filesystems. Initially, a staging trail consists of one volume and grows to several volumes to accommodate the staged data. A staging trail and *staging template* share the same name.

stale data Data that remains on optical disk or tape after the data is staged in to magnetic disk and modified. When a large number of files become stale, the volume becomes a good candidate for compaction.

store ID Unique code that identifies a client store on the network.

System Monitoring Support (SysMon) Software which conveys the functionality that provides system monitoring, including RASD (Reliability Agent Scanner Daemon) and RSM (Remote System Monitor).

target ID Middle part of a SCSI address (channel, target ID, LUN). Target IDs are numbered 0 - 7.

template Also called backup schedule template. A set of specifications for scheduling backups and use of media. Each template is uniquely named and includes a list of work group names, the name of the trailset (which defines media use), and scheduling parameters, including the rotation period for scheduling full backups, weekend backup policy, and weeknight backup shift lengths.

See also volume template.

thrashing Unnecessary staging of files and movement of the autochanger in a library unit.

trail Serial set of volumes of a particular media type. Each trail of volumes is written to over the course of one rotation period and then a new set of volumes is started. The trail specification also defines how long to save the backup data and its associated online catalogs and records. While uniqueness is provided by the combination of template, trailset, and trail names, it is helpful to give a unique name for each trailset instance.

trailset Trail or set of trails to which the backup data is written, constituting a complete set of full and incremental backups for a rotation period. While uniqueness is provided by the combination of (schedule) template, trailset, and trail names, it is helpful to give a unique name for each trailset instance. Also called media set.

username Username on the client that is used by EDM Backup to execute the client software processing. (The username is "ebadmin" by default for all UNIX filesystems.)

volume Secondary storage media, such as tape cartridges, that contains a volume label and is entered into the volume catalog.

volume catalog File that contains information about all removable media that is known to the EDM server. The volume catalog holds detailed information for each volume including a unique volume identifier, media characteristics, and the volume's current state.

volume ID Unique identification number electronically assigned to every piece of secondary storage media managed by the server.

volume label Unique machine-readable code written on the backup media that includes a *volume sequence number*, *volume state*, *volume ID*, and *volume name*. All forms of removable media must be labeled before volume management can allocate them to an application.

volume life cycle Stages through which media (magnetic tapes and optical disks) pass in the EDM system. New media begins as unlabeled and moves to available (ready for general use for any trail) or allocated (ready for a particular trail only) depending on which template you choose during the labeling process. Other states include: foreign (non-EDM media), uncataloged (labeled on another EDM server), erasing (optical disks only), and expired (no longer writable, just readable).

volume management See EDM Volume Management.

Volume Manager Central volume management process within EDM software that manages all removable media known to an EDM server. The Volume Manager maintains the volume catalog and manages volume allocation, access, and volume life cycles.

volume sequence number Unique identification number electronically assigned to every form of removable media managed by EDM Volume Management.

volume state Specific mode or phase in the media's life cycle. See also volume life cycle.

volume template Named template that volume management uses for labeling volumes. See also volume label.

watermark In HSM, preconfigured levels that divide a filesystem into disk utilization zones. Watermarks are expressed as percentages of total disk space. EDM Migration has three watermarks: high watermark, low watermark, and prestage watermark. The watermarks define the yellow zone, green zone, and prestage reserve.

There are three sample settings: archive setting, cached setting, and random setting.

window manager Software that enables manipulation of windows.

work group Set of work items that are to be backed up to the same set of media. Each work group is uniquely named and includes a list of like work items (that is, you cannot mix filesystem, PC, and database work items in the same work group).

work item Client resource that you want to back up. A resource can be a UNIX filesystem, data on a PC server, or an Oracle, Sybase, or Informix database. Each work item is uniquely named and specifies the filesystems, database, or PC data to be backed up. You cannot mix filesystem, database, and PC work items in one work group.

working set In HSM, the space on magnetic disk between the LWM and the non-stageable data. The working set represents the files that are accessed in a given period of time.

WORM optical disk Optical disk that does not allow data to be erased or rewritten.

yellow zone Space on magnetic disk between 100% capacity and the HWM. The yellow zone is reserved for processes to use while HSM brings filesystem usage back down to the LWM.

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